US009485638B2

(12) **United States Patent**
Jordan, Jr.

(10) **Patent No.: US 9,485,638 B2**
(45) **Date of Patent: *Nov. 1, 2016**

(54) **APPARATUS, SYSTEM AND METHOD FOR FORWARDING DATA SENT TO A WIRELESS DEVICE TO ANOTHER ADDRESS**

(71) Applicant: **AT&T Intellectual Property I, L.P.**, Atlanta, GA (US)

(72) Inventor: **Royce D. Jordan, Jr.**, Lawrenceville, GA (US)

(73) Assignee: **AT&T Intellectual Property I, L.P.**, Atlanta, GA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **14/077,520**

(22) Filed: **Nov. 12, 2013**

(65) **Prior Publication Data**

US 2015/0334542 A1 Nov. 19, 2015

Related U.S. Application Data

(63) Continuation of application No. 12/984,107, filed on Jan. 4, 2011, now Pat. No. 8,583,083, which is a continuation of application No. 11/610,762, filed on Dec. 14, 2006, now Pat. No. 7,865,175, which is a continuation of application No. 10/097,310, filed on Mar. 14, 2002, now Pat. No. 7,187,921.

(60) Provisional application No. 60/339,975, filed on Dec. 10, 2001.

(51) **Int. Cl.**

H04W 4/16	(2009.01)
H04W 8/26	(2009.01)
H04W 64/00	(2009.01)
H04L 12/58	(2006.01)
H04W 4/12	(2009.01)
H04W 8/18	(2009.01)

(52) **U.S. Cl.**

CPC ***H04W 4/16*** (2013.01); ***H04L 12/5855*** (2013.01); ***H04L 51/14*** (2013.01); ***H04L 51/38*** (2013.01); ***H04W 8/26*** (2013.01); ***H04W 64/003*** (2013.01); *H04L 12/5895* (2013.01); *H04W 4/12* (2013.01); *H04W 8/18* (2013.01)

(58) **Field of Classification Search**

CPC H04L 51/14; H04L 51/38; H04W 8/26; H04W 64/003

USPC 370/331, 338, 352, 402; 455/412.1, 455/432, 461, 417; 709/203, 206, 228, 245, 709/249; 379/201.01, 201.02

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,559,800 A 9/1996 Mousseau et al.
5,570,366 A 10/1996 Baker et al.

(Continued)

OTHER PUBLICATIONS

U.S. Office Action dated Mar. 27, 2013 in U.S. Appl. No. 12/984,107.

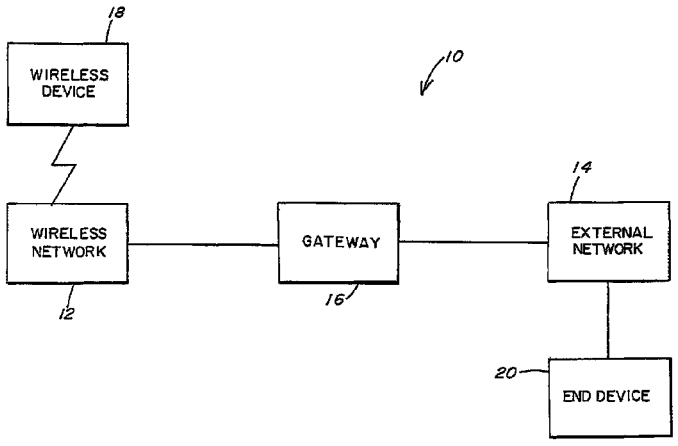
(Continued)

Primary Examiner — Gerald Gauthier
(74) *Attorney, Agent, or Firm* — Hartman & Citrin LLC

(57) **ABSTRACT**

An apparatus for forwarding data sent to a wireless device having a first address to a second address. The apparatus includes a server in communication with a wireless network and an external network. The server includes a processor. The processor includes a data forwarding module for forwarding the data to the second address via the external network when the wireless device is not in communication with the wireless network.

20 Claims, 6 Drawing Sheets



(56) **References Cited**

U.S. PATENT DOCUMENTS

5,572,528	A *	11/1996	Shuen	H04L 12/4604 370/338
5,761,290	A	6/1998	Farris et al.	
5,903,845	A *	5/1999	Buhrmann	H04M 3/4228 379/211.02
5,933,477	A	8/1999	Wu	
6,147,977	A	11/2000	Thro et al.	
6,182,120	B1	1/2001	Beaulieu et al.	
6,208,854	B1	3/2001	Roberts et al.	
6,208,998	B1	3/2001	Marcus	
6,219,694	B1	4/2001	Lazaridis et al.	
6,263,064	B1	7/2001	O'Neal et al.	
6,272,339	B1	8/2001	Wiedeman	
6,353,852	B1	3/2002	Nestoriak, III et al.	
6,356,543	B2	3/2002	Hall et al.	
6,430,604	B1	8/2002	Ogle et al.	
6,463,145	B1	10/2002	O'Neal et al.	
6,463,462	B1	10/2002	Smith et al.	
6,510,381	B2	1/2003	Grounds et al.	
6,587,684	B1	7/2003	Hsu et al.	
6,625,135	B1	9/2003	Johnson et al.	
6,678,361	B2	1/2004	Rooke	
6,697,354	B1 *	2/2004	Borella	H04L 29/12009 370/352
6,697,474	B1 *	2/2004	Hanson	H04L 12/581 379/201.1
6,728,357	B2	4/2004	O'Neal et al.	
6,892,074	B2	5/2005	Tarklainen et al.	
6,928,468	B2	8/2005	Leemakers	
6,934,532	B2	8/2005	Coppinger et al.	
6,965,765	B2	11/2005	Creemer et al.	
7,082,116	B2 *	7/2006	Reza	H04L 69/167 370/338
7,120,435	B2	10/2006	Usher et al.	
7,158,497	B2 *	1/2007	Li	H04L 61/2015 370/331
7,162,237	B1	1/2007	Silver et al.	
7,187,921	B1 *	3/2007	Jordan, Jr.	H04L 12/5855 379/93.24
7,194,252	B1	3/2007	Jordan, Jr.	
7,212,505	B2	5/2007	Saint-Hillaire et al.	
7,245,925	B2	7/2007	Zellner	
7,269,431	B1	9/2007	Gilbert	
7,272,662	B2	9/2007	Chesnals et al.	
7,359,720	B2	4/2008	Hartmaier et al.	
7,363,345	B2	4/2008	Austin-Lane et al.	
7,373,144	B1	5/2008	Kiilpatrick et al.	
7,376,957	B1	5/2008	Scurlock, Jr.	
7,383,052	B2	6/2008	Moton et al.	
7,388,950	B2 *	6/2008	Elsey	G06Q 10/109 379/201.02
7,428,410	B2	9/2008	Petry et al.	
7,457,616	B2	11/2008	Link et al.	
7,502,362	B1	3/2009	Koskinen et al.	
7,804,821	B2	9/2010	Wilhoite et al.	
7,984,099	B1	7/2011	Horstmann et al.	
2001/0005857	A1	6/2001	Lazaridis et al.	
2001/0037407	A1	11/2001	Dragulev et al.	
2001/0043273	A1	11/2001	Herrod et al.	
2002/0019880	A1	2/2002	Sakakura	
2002/0087704	A1 *	7/2002	Chesnais	H04L 12/5835 709/228
2002/0090963	A1	7/2002	Avalos et al.	
2002/0160757	A1	10/2002	Shavit et al.	
2002/0164983	A1 *	11/2002	Raviv	H04L 29/06 455/432.1
2002/0167488	A1	11/2002	Hinckley et al.	
2003/0018796	A1	1/2003	Chou et al.	
2003/0028671	A1 *	2/2003	Mehta	H04L 29/12066 709/245
2003/0048751	A1	3/2003	Han et al.	
2003/0058853	A1	3/2003	Gorbatov et al.	
2003/0060240	A1	3/2003	Graham et al.	
2003/0109247	A1	6/2003	Lindgren et al.	
2004/0058673	A1	3/2004	Irlam et al.	
2005/0010694	A1	1/2005	Ma et al.	
2006/0029038	A1 *	2/2006	Jungck	H04L 29/12066 370/351
2006/0089126	A1	4/2006	Frank et al.	
2007/0087729	A1	4/2007	Jordan	
2008/0275950	A1 *	11/2008	Jordan	G06F 17/30575 709/203
2011/0099240	A1	4/2011	Jordan, Jr.	

OTHER PUBLICATIONS

U.S. Notice of Allowance dated Jul. 11, 2013 in U.S. Appl. No. 12/984,107.
U.S. Office Action dated Oct. 7, 2008 in U.S. Appl. No. 11/610,762.
U.S. Office Action dated Apr. 1, 2009 in U.S. Appl. No. 11/610,762.
U.S. Office Action dated Nov. 17, 2009 in U.S. Appl. No. 11/610,762.
U.S. Office Action dated Apr. 29, 2010 in U.S. Appl. No. 11/610,762.
U.S. Notice of Allowance dated Aug. 31, 2010 in U.S. Appl. No. 11/610,762.
U.S. Office Action dated Nov. 3, 2004 in U.S. Appl. No. 10/097,310.
U.S. Office Action dated Jun. 16, 2005 in U.S. Appl. No. 10/097,310.
U.S. Office Action dated Jan. 3, 2006 in U.S. Appl. No. 10/097,310.
U.S. Office Action dated Jun. 19, 2006 in U.S. Appl. No. 10/097,310.
U.S. Notice of Allowance dated Oct. 27, 2006 in U.S. Appl. No. 10/097,310.

* cited by examiner

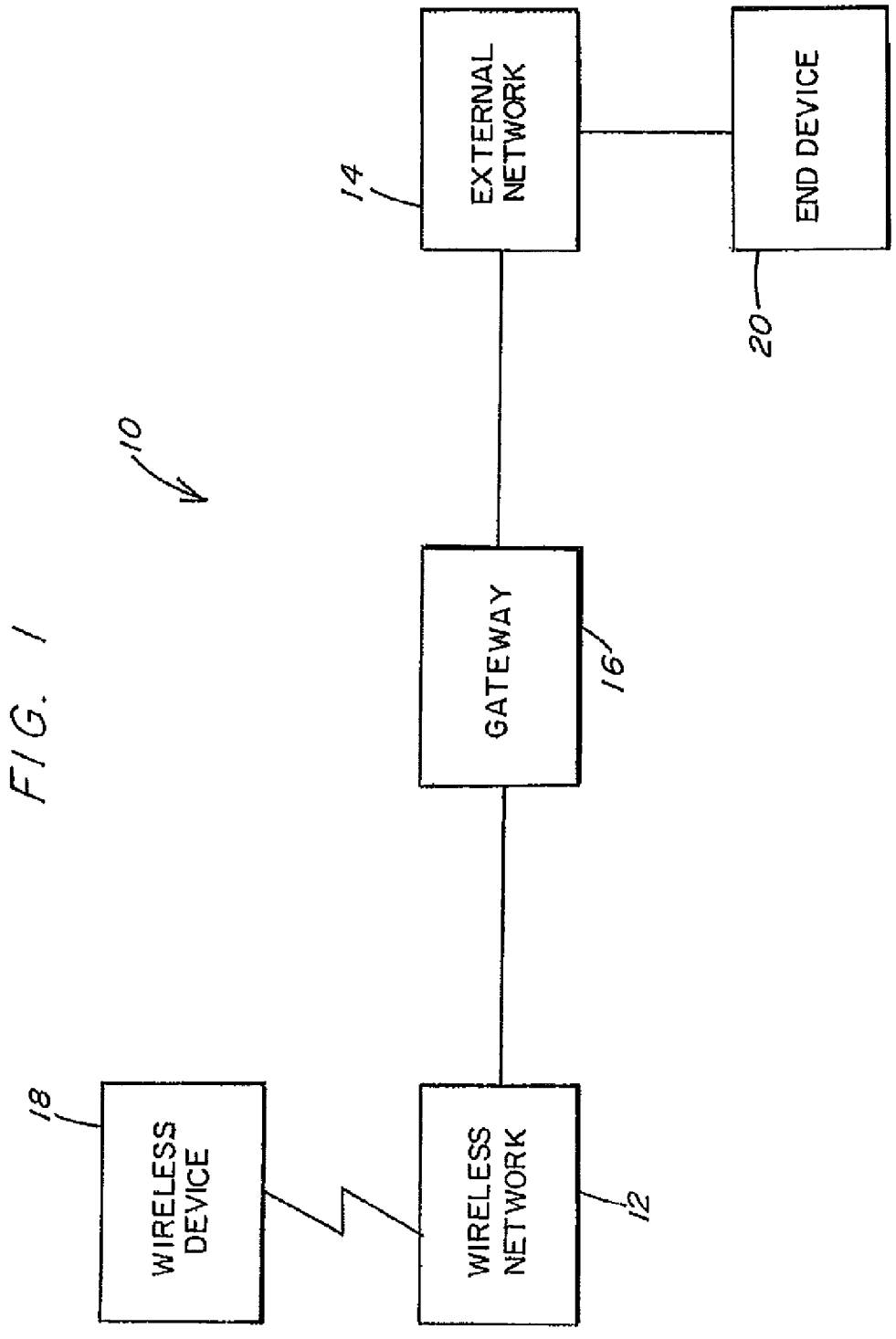

EXTERNAL NETWORK
14
END DEVICE
20
10
GATEWAY
16
WIRELESS DEVICE
18
WIRELESS NETWORK
12

FIG. 1

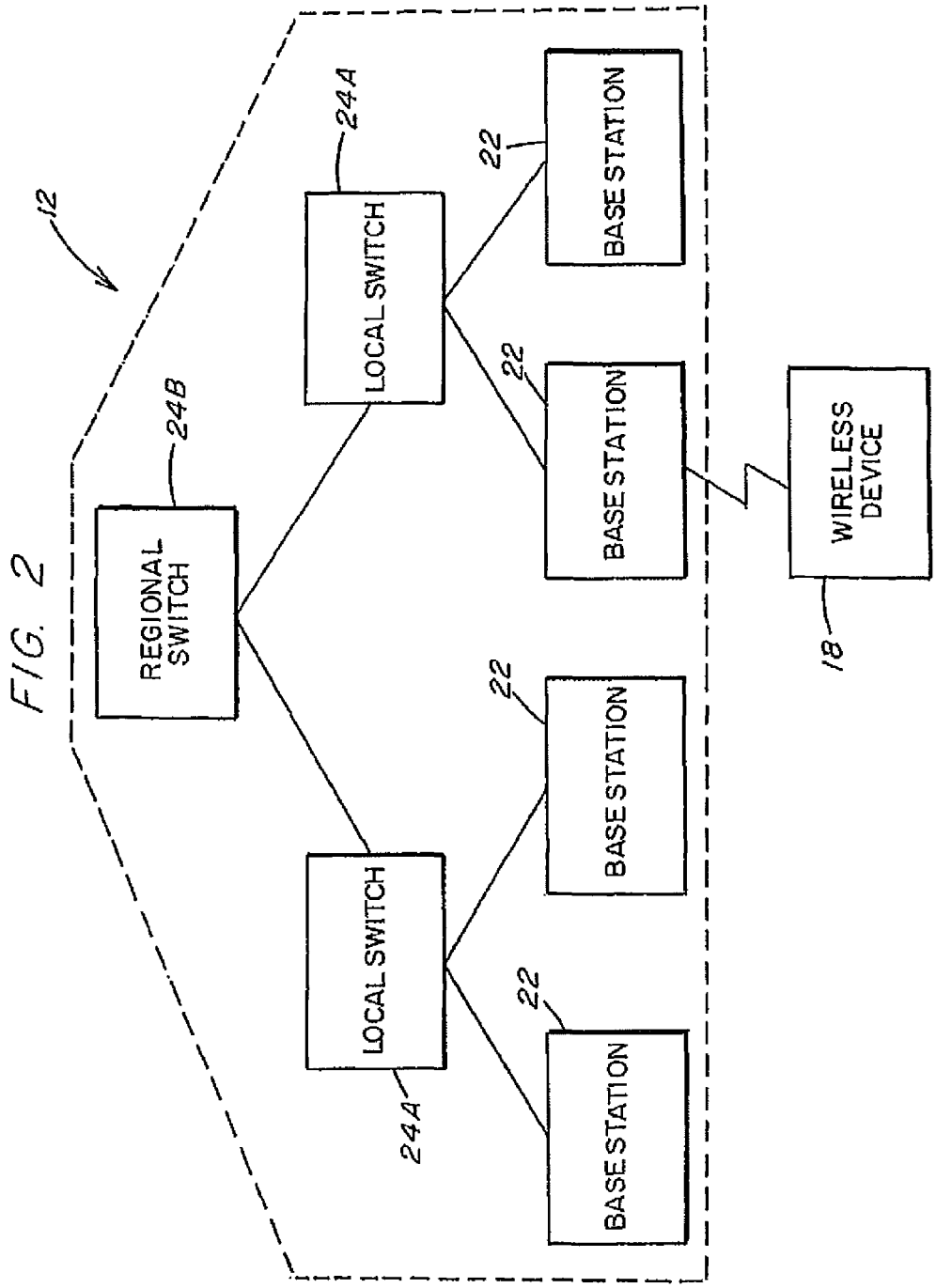
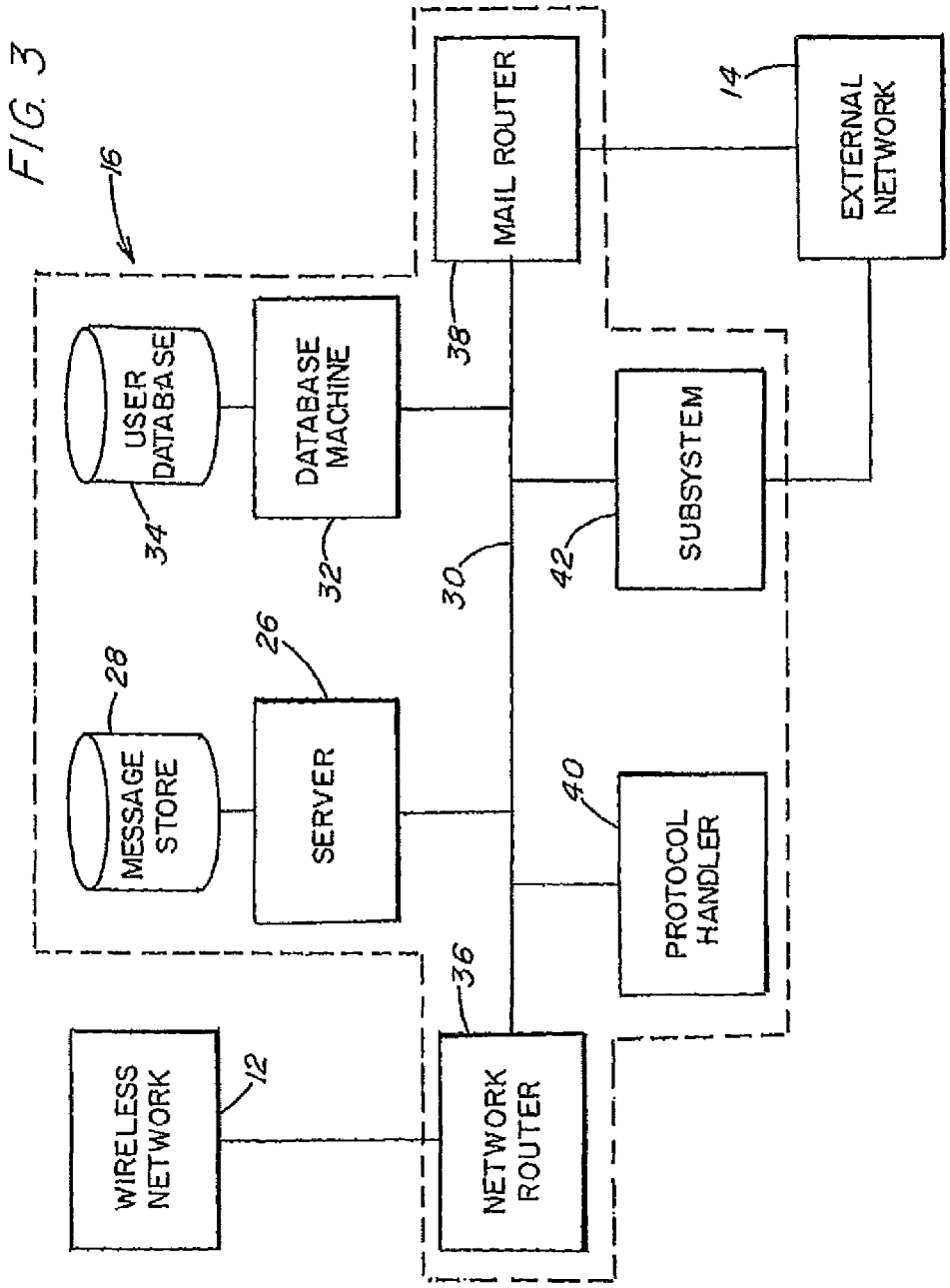

12
REGIONAL SWITCH
24B
LOCAL SWITCH
24A
LOCAL SWITCH
24A
BASE STATION
22
BASE STATION
22
BASE STATION
22
BASE STATION
22
WIRELESS DEVICE
18

FIG. 2

FIG. 3


16
MAIL ROUTER
14
EXTERNAL NETWORK
38
USER DATABASE
DATABASE MACHINE
34
32
30
42
SUBSYSTEM
28
26
MESSAGE STORE
SERVER
40
PROTOCOL HANDLER
36
WIRELESS NETWORK
12
NETWORK ROUTER

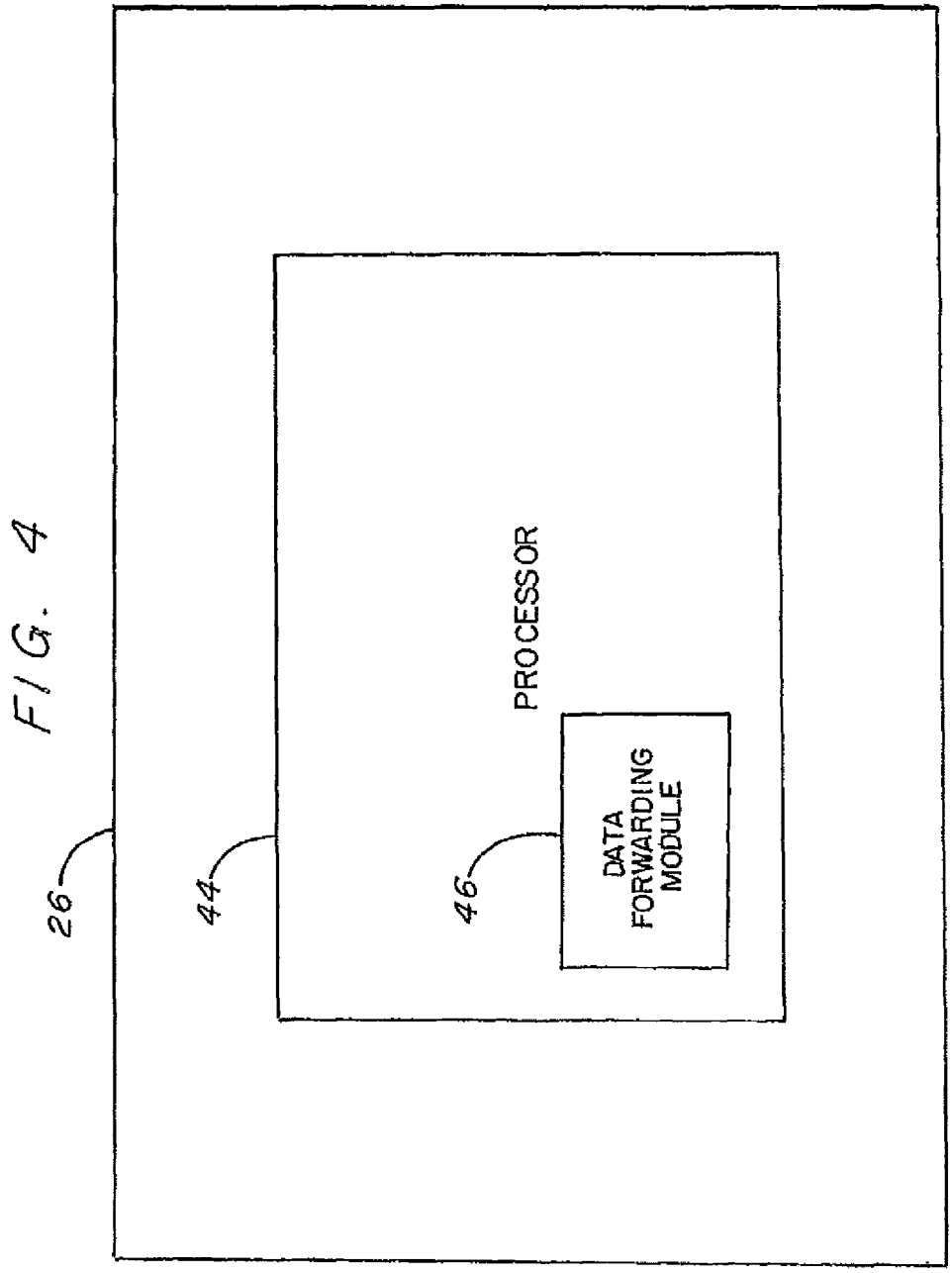
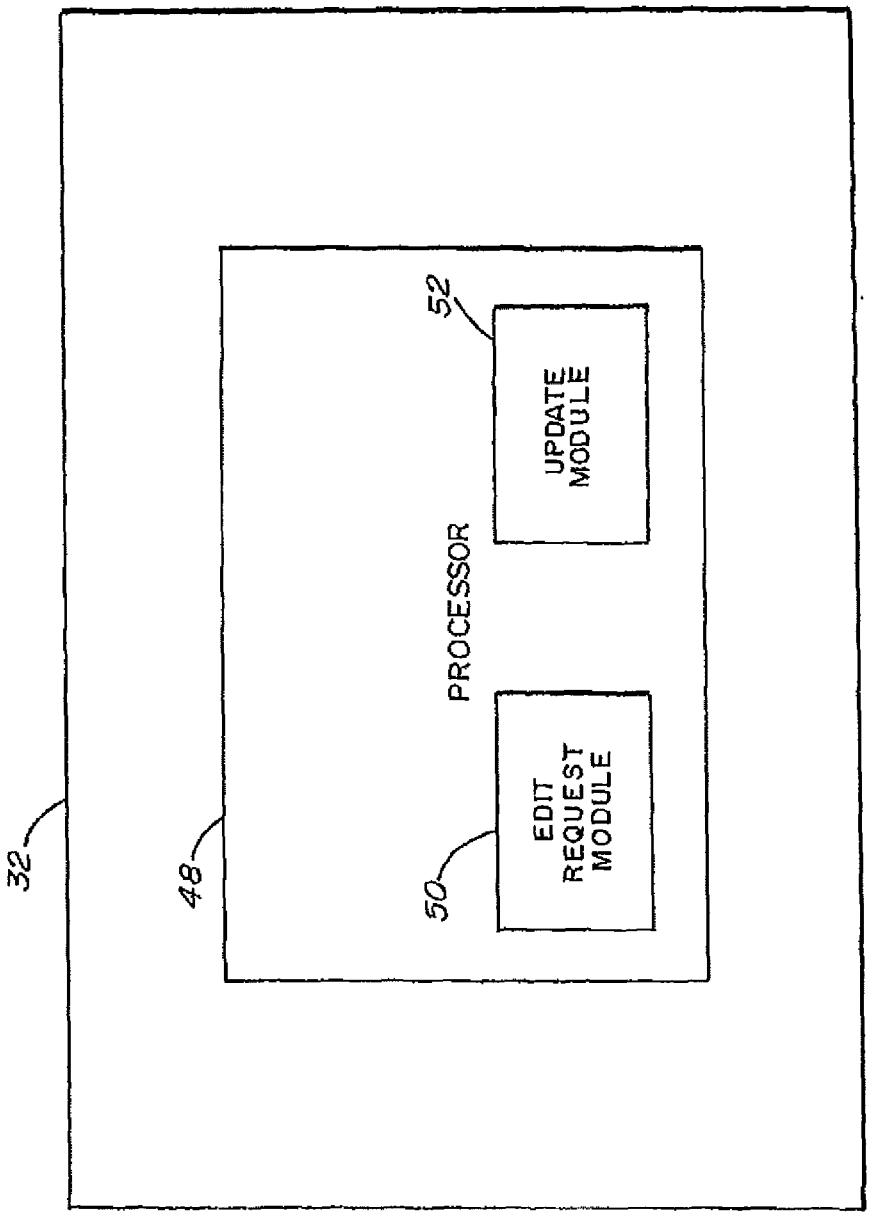


FIG. 4

FIG. 5



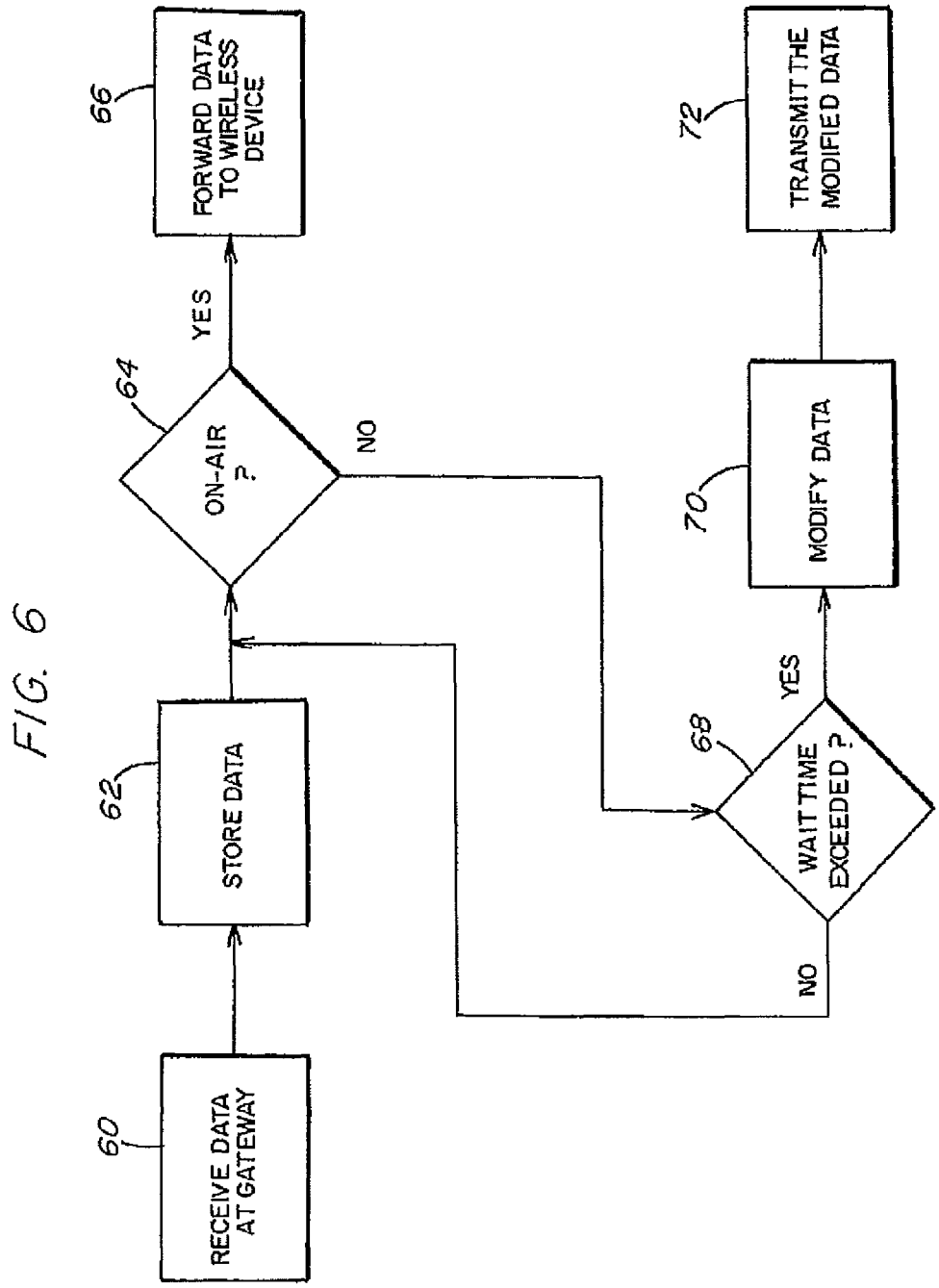

RECEIVE DATA AT GATEWAY
60
STORE DATA
62
ON-AIR ?
64
YES
NO
FORWARD DATA TO WIRELESS DEVICE
66
WAIT TIME EXCEEDED ?
68
YES
NO
MODIFY DATA
70
TRANSMIT THE MODIFIED DATA
72

FIG. 6

APPARATUS, SYSTEM AND METHOD FOR FORWARDING DATA SENT TO A WIRELESS DEVICE TO ANOTHER ADDRESS

CROSS REFERENCE TO RELATED APPLICATIONS

This application is a continuation of U.S. application Ser. No. 12/984,107, filed Jan. 4, 2011 (now U.S. Pat. No. 8,583,083), which is a continuation of U.S. application Ser. No. 11/610,762, filed Dec. 14, 2006 (now U.S. Pat. No. 7,865,175), which is a continuation of U.S. application Ser. No. 10/097,310, filed Mar. 14, 2002 (now U.S. Pat. No. 7,187,921), which claims the benefit of U.S. Provisional Patent Application No. 60/339,975, filed Dec. 10, 2001, the entireties of which are herein incorporated by reference.

BACKGROUND

A user of a wireless device associated with a wireless network may employ the wireless device to send and receive data via the wireless network while the wireless device is in communication with the wireless network. However, when a user of the wireless device turns the wireless device off, or the wireless device is outside an area covered by the wireless network, the user loses the ability to send and receive data via the wireless network. If data is sent to the user while the wireless device is not in communication with the wireless network, the data will not be delivered to the user via the wireless device until the wireless device is turned on and is in a geographic area served by the wireless network. As a result, the user may be unaware of the sent data for an unacceptable period of time. Thus, there exists a need for an apparatus, system and method for forwarding data sent to a wireless device to another address when the wireless device is not in communication with the wireless network.

SUMMARY

According to one embodiment, the present invention provides an apparatus for forwarding data sent to a wireless device having a first address to a second address. The apparatus includes a server in communication with a wireless network and an external network, wherein the server includes a processor. The processor includes a data forwarding module for forwarding the data to the second address via the external network when the wireless device is not in communication with the wireless network.

According to another embodiment, the invention provides an apparatus for editing a profile of a user associated with a wireless network. The apparatus includes a database machine in communication with the wireless network. The database machine includes a processor, and the processor includes an edit request module for receiving a request to alter the profile of the user and an update module for altering the profile of the user.

According to another embodiment, the invention provides a system for forwarding data sent to a wireless device having a first address to a second address. The system includes a gateway in communication with a wireless network and an external network, wherein the gateway includes a server. The server includes a processor, and the processor includes a data forwarding module for forwarding the data to the second address via the external network when the wireless device is not in communication with the wireless network.

According to another embodiment, the invention provides a system for editing a profile of a user associated with a wireless network. The system includes a gateway in communication with the wireless network, wherein the gateway includes a database machine. The database machine includes a processor, and the processor includes an edit request module for receiving a request to alter the profile of the user and an update module for altering the profile of the user.

According to another embodiment, the invention provides a method for forwarding data sent to a wireless device having a first address to a second address. The method includes receiving data sent to the first address, the data having a header portion that identifies the first address as a data delivery address, modifying the data, and transmitting the modified data to the second address.

These and various other embodiments of the invention are pointed out with particularity in the claims annexed hereto and forming a part hereof. For a better understanding of the invention, however, reference should be made to the drawings which form a further part hereof, and to the accompanying descriptive matter, in which there are illustrated and described specific examples of an apparatus and method in accordance with the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** illustrates a simplified block diagram of a system according to one embodiment of the present invention;

FIG. **2** illustrates one embodiment of the wireless network of FIG. **1**;

FIG. **3** illustrates one embodiment of the gateway of FIG. **1**;

FIG. **4** illustrates one embodiment of the server of FIG. **3**;

FIG. **5** illustrates one embodiment of the database machine of FIG. **3**; and

FIG. **6** illustrates a process flow according to one embodiment of the present invention.

DESCRIPTION

It is to be understood that the figures and descriptions of the present invention have been simplified to illustrate elements that are relevant for a clear understanding of the present invention, while eliminating, for purposes of clarity, other elements of a conventional communications network. Those of ordinary skill in the art will recognize, however, that these and other elements may be desirable in a typical communications network. However, because such elements are well known in the art, and because they do not facilitate a better understanding of the present invention, a discussion of such elements is not provided herein.

FIG. **1** illustrates a simplified block diagram of a system **10** according to one embodiment of the present invention. The system **10** may include a wireless network **12**, an external network **14**, and a gateway **16** in communication with the wireless network **12** and the external network **14**.

The communications between the gateway **16** and the wireless network **12** may use, for example, the X.25 protocol. The wireless network **12** may also be in communication with a wireless device **18** such as, for example, a wireless pager, and may communicate with the wireless device **18** using an over-the-air protocol such as HP98 or the Blackberry protocol developed by RIM (Research in Motion). According to other embodiments, the wireless device **18** may be a personal digital assistant (PDA), a wireless telephone, a wireless personal computer, a wireless modem, or any wireless device configured to communicate with the wireless network **12**. According to one embodiment, the wireless network **12** may be a Mobitex® network operated

by Cingular Interactive, and the communications between the wireless device **18** and the wireless network **12** may be text messages. The wireless network **12** and the gateway **16** are described in more detail hereinbelow with respect to FIGS. **2** and **3**, respectively.

The external network **14** may be any communication network other than the wireless network **12**, and may be in communication with an end device **20**. For example, the external network **14** may be a second wireless network, the Internet, or a telephone network such as the Public Switched Telephone Network (PSTN). According to another embodiment of the present invention, the system **10** may include a plurality of external networks **14**, and each external network **14** may be in communication with the gateway **16**. Thus, the communication between the gateway **16** and any one external network **14** may use, for example, the X.25 protocol, the TCP/IP protocol, or a Telocator Alphanumeric Protocol such as XTAP. The end device **20** may be, for example, a wireless device in communication with a second wireless network, a terminal or a computer in communication with the Internet, a telephone in communication with the PSTN, or a facsimile machine in communication with the PSTN.

FIG. **2** illustrates one embodiment of the wireless network **12** of FIG. **1**. The wireless network **12** may include one or more radio base stations **22**. Each radio base station **22** services a different radio cell, and each radio cell may have a diameter of approximately ten to twenty miles, depending on environmental and other conditions. The radio base stations **22** define the coverage area of the wireless network **12**. In operation, the wireless device **18** communicates with its nearest base station **22**, but is also able to communicate with other base stations **22** as its location changes. The wireless network **12** may also include one or more switches **24** that are organized in a hierarchy of local switches **24**A and regional switches **24**B connected to one another by fixed communication links. The switches **24** route communication traffic between the radio base stations **22**, and one or more of the switches **24** may provide a connection to the gateway **16**.

FIG. **3** illustrates one embodiment of the gateway **16** of FIG. **1**. The gateway **16** includes a server **26** having a message store **28** associated therewith. The server **26** may be implemented as, for example, a network file system (NFS) server, and will be described in more detail hereinbelow with respect to FIG. **4**.

The message store **28** is in communication with the server **26**, and may be implemented as a database configured with a directory structure. The message store **28** may include a mailbox for storing data that has been sent to a wireless device **18** having a first address and associated with the wireless network **12**. Data stored in the mailbox may include a data delivery address, and may be held in one or more of the fields of a record in the database. The message store **28** may also include a plurality of mailboxes, each mailbox being associated with a different user that is associated with the wireless network **12**, and the directory structure may be used to identify a particular mailbox. The message store **28** may comprise a portion of the server **26** or may be located external to the server **26**. According to one embodiment, the gateway **16** may also include a plurality of message stores **28**, and each message store **28** may serve as a backup to the other message stores **28**.

The gateway **16** may also include an internal network **30**, a database machine **32** having a user database **34** associated therewith, a network router **36**, a mail router **38**, and a protocol handler **40**. The internal network **30** may be connected to the server **26**, the database machine **32**, the network router **36**, the mail router **38**, and the protocol handler **40**, and may, for example, be implemented as a local area network (LAN).

The database machine **32** may be implemented as a c-tree server manufactured by FairCom Corporation, and will be described in more detail hereinbelow with respect to FIG. **5**. The user database **34** is in communication with the database machine **32**, and may be configured with a directory structure. The user database **34** may include a profile associated with a user of the wireless network **12**. Such a profile may include the name of the user, a password associated with the user, a user account number, a unique identifier such as, for example, a unique access number associated with the user, and a list of services subscribed to. The profile may also include a primary address, an alternate delivery address associated with the primary address, and a waiting time.

The primary address may be associated with the wireless device **18**, and may indicate where the user wishes to receive data such as, for example, an e-mail message. The alternate delivery address may be associated with the end device **20**, and may indicate where the user wishes to receive data addressed to the primary address when the wireless device **18** is turned off or is outside the coverage area of the wireless network **12**. The primary address may have a plurality of alternate delivery addresses associated therewith. The waiting time may represent the minimum period of time that the user wishes to have data sent to the primary address remain undelivered before the data is forwarded to the alternate delivery address. For example, there may be instances when the user knows that the wireless device **18** will be turned off or outside the coverage area of the wireless network **12** for a relatively short period of time. In such instances, the waiting time may be set to prevent the data from being forwarded to an alternate delivery address.

The profile may be represented by data held in one or more fields of a record in the user database **34**, and may be created or edited at any time. According to one embodiment, the user may send a message to the gateway **16**, wherein the message includes information specifying the primary address to be associated with the wireless device **18**, one or more alternate delivery addresses, and a value for the waiting time. The gateway **16** may then create or edit the profile according to the information included in the message. According to another embodiment, the user may send a message to the gateway **16**, wherein the message includes information instructing the gateway **16** to enable or disable the data forwarding function of the present invention.

The user database **34** may also include a plurality of profiles, each profile being associated with a different user that is associated with the wireless network **12**. The user database **34** may include a directory structure, and the directory structure may be used to identify a particular profile. The user database **34** may comprise a portion of the database machine **32** or may be located external to the database machine **32**. According to one embodiment, the gateway **16** may include a plurality of database machines **32** that may serve as a backup to the other database machines **32**. According to another embodiment of the present invention, the database machine **32** and the server **26** may be combined into a single computer (not shown) that is in communication with the message store **28**, the user database **34**, and the internal network **30**.

The network router **36** is connected to the wireless network **12** and the internal network **30**, and may use the X.25 protocol to communicate with one or more of the wireless network switches **24** via fixed communication links. The network router **36** may include up to two dual-

ported connectivity cards. Thus, the network router **36** may include up to four fast-sequenced transport (FST) connections. The network router **36** may receive message packets from and send message packets to the wireless network **12**. The network router **36** may also route the message packets received from the wireless network **12** to the protocol handler **40** via the internal network **30**. Communications between the network router **36** and the protocol handler **40** may use the user datagram protocol (UDP) that comprises a part of the TCP/IP protocol suite. According to one embodiment, the gateway **16** may include up to 255 network routers **36**, and each network router **36** may serve as a backup to the other network routers **36**.

The mail router **38** may be connected to the Internet and the internal network **30**, and may use the TCP/IP protocol to communicate with the Internet via a fixed communication link. The mail router **38** may receive message packets from and send message packets to the Internet. The mail router **38** may also route the message packets received from the Internet to the protocol handler **40** via the internal network **30**. Communications between the mail router **38** and the protocol handler **40** may use the user datagram protocol (UDP). According to one embodiment, the gateway **16** may include a plurality of mail routers **38**, and each mail router **38** may serve as a backup to the other mail routers **38**.

The protocol handler **40** is connected to the internal network **30**, and may process communications received by the gateway **16** from the wireless network **12** or the external network **14**. The underlying protocol for decoding messages received from or packaging messages sent to the wireless network **12** and the external network **14** may be simple mail transfer protocol (SMTP). The protocol handler **40** may communicate with the server **26**, the database machine **32**, the network router **36** and the mail router **38** using X-sockets over internal network **30**. Such sockets may be, for example, point-to-point, two-way software communications interfaces that direct the protocol handler **40** to access the internal network **30** by creating a communications end-point or socket and returning a file descriptor with which to access the socket. The protocol handler **40** may also maintain a database cache (not shown), i.e., a small, fast memory holding recently accessed data, to speed up internal network communications and to limit database access requests over the LAN.

The protocol handler **40** may handle protocols associated with the wireless network **12** and the external network **14**. The protocol handler **40** may be a UNIX machine, and the protocols handled by the protocol handler **40** may specify that the storage of and access to data in the message store **28** may be handled by a UNIX-based network file system (NFS) that allows data to be shared across the internal network **30** regardless of the protocol. According to one embodiment, the gateway **16** may include a plurality of protocol handlers **40**, and each protocol handler **40** may serve to back up the other protocol handlers **40**.

The gateway **16** may also include one or more subsystems **42** that are in communication with the internal network **30** and an external network **14**. The subsystems **42** may include, for example, a faxmail system, a pagemail system, a phonemail system, or an interactive voice response system (IVRS).

According to one embodiment, the gateway **16** may be configured as a standard Santa Cruz Operation (SCO) UNIX system. The gateway **16** may use both TCP/IP and UDP for communications, and hypertext markup language (HTML) may be used to support Internet web browsers, including those provided by Netscape and Microsoft. The application programs used by the gateway components may be written in, for example, the C programming language, Java or HTML.

FIG. **4** illustrates one embodiment of the server **26** of FIG. **3**. The server **26** may include a processor **44**. The server **26** may also include an interface to content addressable memory (CAM) (not shown) for updating data stored in the message store **28**. The processor **44** may be a central processing unit (CPU) including, e.g., a microprocessor, an application specific integrated circuit (ASIC), or one or more printed circuit boards. The processor **44** may include a data forwarding module **46** for forwarding data sent to a wireless device **18** having a first address to a second address via the external network **14** when the wireless device **18** is not in communication with the wireless network **12**.

The data forward module **46** may be implemented, for example, as microcode configured into the logic of the processor **44**, or may be implemented as programmable microcode stored in an electrically erasable programmable read only memory (EEPROM). According to another embodiment, the data forward module **46** may be implemented as software code to be executed by the processor **44**. The software code may be written in any suitable programming language using any suitable programming technique. For example, the software code may be written in C using procedural programming techniques, or in Java or C++ using object-oriented programming techniques. The software code may be stored as a series of instructions or commands on a computer readable medium, such as a random access memory (RAM) or a read only memory (ROM), a magnetic medium such as a hard-drive or a floppy disk, or an optical medium such as a CD-ROM.

FIG. **5** illustrates one embodiment of the database machine **32** of FIG. **3**. The database machine **32** may include a processor **48**. The database machine **32** may also contain an interface to content addressable memory (CAM) (not shown) for updating information stored in the user database **34**. The processor **48** may be a central processing unit (CPU) including, e.g., a microprocessor, an application specific integrated circuit (ASIC), or one or more printed circuit boards. The processor **48** may include an edit request module **50** for receiving a request to alter the profile of a user via the external network **14**, and an update module **52** for altering the profile of the user.

The modules **50**, **52** may be implemented as microcode configured into the logic of the processor **48**, or may be implemented as programmable microcode stored in an electrically erasable programmable read only memory (EEPROM). According to another embodiment, the modules **50**, **52** may be implemented as software code to be executed by the processor **48**. The software code may be written in any suitable programming language using any suitable programming technique. For example, the software code may be written in C using procedural programming techniques, or in Java or C++ using object-oriented programming techniques. The software code may be stored as a series of instructions or commands on a computer readable medium, such as a random access memory (RAM) or a read only memory (ROM), a magnetic medium such as a hard-drive or a floppy disk, or an optical medium such as a CD-ROM.

FIG. **6** illustrates a process flow according to one embodiment of the present invention. For data such as, for example, an e-mail, to be delivered to the wireless device **18**, the data may include information identifying the address of the wireless device **18** as the delivery address of the data. Such information is generally found in a header attached to the data to be sent. Accordingly, data transmitted to the wireless

device **18** may include a header portion that includes the delivery address of the data. As described hereinbefore, if the wireless device **18** is turned off or is outside the coverage area of the wireless network **12**, a user of the wireless device **18** will be unable to receive the data via the wireless device **18**. One embodiment of the present invention may allow the user to receive the data via the end device **20** connected to the external network **14** when the wireless device **18** is not in communication with the wireless network **12**.

The process begins at block **60**, where data sent to a user of the wireless device **18** are received at the gateway **16**. From block **60**, the process proceeds to block **62**, where the data are stored at the message store **28** in a mailbox associated with the user. From block **62**, the process proceeds to block **64**, where the gateway **16** determines whether or not the wireless device **18** is in communication with the wireless network **12** (i.e., whether the wireless device **18** is "on-air" or "off-air"). The gateway **16** may determine the status of the wireless device **18** by querying a location register associated with the wireless network **12**. The location register may be a database associated with the wireless network **12**, and may include information associated with the status of the wireless device **18**. Such information may include, for example, whether the wireless device **18** is "on-air" or "off-air."

If the query indicates that the wireless device **18** is "on-air," the process proceeds from block **64** to block **66**, where the data are forwarded from the gateway **16** to the wireless device **18**. However, if the query indicates that the wireless device **18** is "off-air," the process proceeds from block **64** to block **68**, where the gateway **16** determines whether the waiting time specified in the user profile maintained in the user database **34** has been exceeded.

If the waiting time has not been exceeded, the process proceeds from block **68** back to block **64**, where the process proceeds as described hereinabove. If the waiting time has been exceeded, the process proceeds from block **68** to block **70**, where the gateway **16** modifies the data. The gateway **16** may modify the data by changing the delivery address of the data, and the data may be modified in a variety of ways. According to one embodiment, the delivery address may be removed from the header portion of the data stored in the mailbox, and replaced with an alternate delivery address that is listed in the user profile maintained in the user database **34**. According to another embodiment, a copy of the non-header portion of the data stored in the mailbox may be created, and a header including an alternate delivery address that is listed in the user profile may be attached thereto. According to another embodiment, a plurality of copies of the non-header portion of the data stored in the mailbox may be created. Thereafter, each copy may have a header attached thereto, wherein each header includes a different alternate delivery address, and wherein each alternate delivery address is listed in the user profile maintained in user database **34**. From block **70**, the process proceeds to block **72**, where the gateway **16** transmits the modified data to the alternate delivery address indicated in the header portion of the data via the external network **14**. According to one embodiment, the gateway **16** may transmit the data to a plurality of different addresses via one or more external networks **14**, and the transmission of the data to the plurality of different addresses may occur simultaneously or sequentially.

While several embodiments of the invention have been described, it should be apparent, however, that various modifications, alterations and adaptations to those embodiments may occur to persons skilled in the art with the attainment of some or all of the advantages of the present invention. It is therefore intended to cover all such modifications, alterations and adaptations without departing from the scope and spirit of the present invention as defined by the appended claims.

What is claimed is:

1. A method comprising:

receiving, by a gateway comprising a processor, from a communication device, a message comprising a primary address, an alternate address, and a time period;

creating, by the gateway, a user profile to include the primary address, the alternate address, and the time period; and

forwarding, by the gateway, in response to receiving data intended for the primary address, and in response to criteria associated with the time period being satisfied, the data to the alternate address.

2. The method of claim **1**, wherein the criteria is satisfied when a wireless device associated with the primary address is not in communication with a communication network at a beginning and an end of the time period.

3. The method of claim **2**, wherein the communication network is a first communication network and the alternate address is reachable by the gateway by way of a second communication network being distinct from the first communication network.

4. The method of claim **1**, wherein the time period represents a period of time that the data intended for the primary address remains undelivered to the primary address before the data is forwarded to the alternate address.

5. The method of claim **1**, wherein the alternate address of the message comprises a plurality of alternate addresses for inclusion in the user profile, and wherein forwarding, in response to receiving the data and to the criteria being satisfied, the data to the alternate address comprises forwarding the data to each of the plurality of alternate addresses.

6. The method of claim **1**, wherein the primary address is associated with a wireless device and the alternate address is associated with a device other than the wireless device.

7. The method of claim **1**, wherein the criteria is satisfied when a wireless device associated with the primary address is not in communication with a wireless network at a beginning and an end of the time period, and wherein the data is forwarded to the alternate address via an external network being distinct from the wireless network.

8. The method of claim **1**, further comprising receiving, from the communication device, information instructing the gateway to enable a data forwarding function such that any data intended for the primary address is forwarded to the alternate address if the criteria is satisfied.

9. The method of claim **1**, further comprising receiving, from the communication device, information instructing the gateway to disable a data forwarding function such that any data intended for the primary address is not forwarded to the alternate address.

10. A gateway comprising:

a processor; and

a memory that stores instructions that, when executed by the processor, cause the processor to perform operations comprising:

receiving, from a communication device, a message comprising a primary address, an alternate address, and a time period,

creating a user profile to include the primary address, the alternate address, and the time period, and

forwarding, in response to receiving data intended for the primary address, and in response to criteria associated with the time period being satisfied, the data to the alternate address.

11. The gateway of claim **10**, wherein the criteria is satisfied when a wireless device associated with the primary address is not in communication with a communication network at a beginning and an end of the time period.

12. The gateway of claim **11**, wherein the communication network is a first communication network and the alternate address is reachable by the gateway by way of a second communication network being distinct from the first communication network.

13. The gateway of claim **10**, wherein the time period represents a period of time that the data intended for the primary address remains undelivered to the primary address before the data is forwarded to the alternate address.

14. The gateway of claim **10**, wherein the alternate address of the message comprises a plurality of alternate addresses for inclusion in the user profile, and wherein forwarding, in response to receiving the data and to the criteria being satisfied, the data to the alternate address comprises forwarding the data to each of the plurality of alternate addresses.

15. The gateway of claim **10**, wherein the operations further comprise receiving information instructing the gateway to enable a data forwarding function such that any data intended for the primary address is forwarded to the alternate address if the criteria is satisfied.

16. A computer-readable storage device storing computer-executable instructions that, when executed by a processor of a gateway, cause the processor to perform operations comprising:

receiving, from a communication device, a message comprising a primary address, an alternate address, and a time period;

creating a user profile to include the primary address, the alternate address, and the time period; and

forwarding, in response to receiving data intended for the primary address, and in response to criteria associated with the time period being satisfied, the data to the alternate address.

17. The computer-readable storage device of claim **16**, wherein the criteria is satisfied when a wireless device associated with the primary address is not in communication with a communication network at a beginning and an end of the time period.

18. The computer-readable storage device of claim **17**, wherein the communication network is a first communication network and the alternate address is reachable by the gateway by way of a second communication network being distinct from the first communication network.

19. The computer-readable storage device of claim **16**, wherein the time period represents a period of time that the data intended for the primary address remains undelivered to the primary address before the data is forwarded to the alternate address.

20. The computer-readable storage device of claim **16**, wherein the alternate address of the message comprises a plurality of alternate addresses for inclusion in the user profile, and wherein forwarding, in response to receiving the data and to the criteria being satisfied, the data to each of the plurality of alternate addresses.

* * * * *